REMARKS

Claims 1, 2, 5, 6 and 8-14 are pending in the present application. Claims 1, 2, 5 and 6 are herein amended. Claim 14 is newly added. No new matter has been presented.

Regarding the amendment adding the "basic reaction" limitation, the specification groups ammonia, hydrazine, and water-soluble amine compound together. (Specification, page 3, lines 13-14.) This grouping shows that the compound belonging to the group should be used to cause a basic reaction. Ammonia, hydrazine, and water-soluble amine compound such as methylamine are all weak bases. In addition, the molecular constitution of hydrazine is similar to that of ammonia which is a typical weak base. Further, the specification states that amines are basic. (Specification, page 4, lines 23-24.) Thus, as demonstrated in the specification, hydrazine is used for causing a basic reaction.

Regarding the limitation "to adsorb nitrogen-containing compounds attributable to hydrazine on the surface of said shaped aluminum alloy material" recited in new claim 14, the specification discloses that "The purpose of this process is to adsorb such a nitrogen-containing compound on the aluminum alloy surface" (specification, page 12, lines 14-17), and "nitrogen compounds attributable to hydrazine are present on the aluminum alloy surface" (specification, page 3, lines 23-25).

Claim Rejections – 35 U.S.C. § 103

A. Rejection based on Kallenbach in view of Akihoshi

Claims 1, 2, 8, 9 and 12 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Kallenbach (US 5,212,214) in view of Akihoshi (US 4,642,161). Favorable reconsideration is requested.

Applicants respectfully submit that Kallenbach in view of Akihoshi does not teach or suggest:

> a shaped aluminum alloy material that has been subjected to a dipping process in which it is dipped in a 3 to 10% hydrazine monohydrate aqueous solution at 40 to 70°C, said shaped aluminum alloy material having fine recesses with a diameter of 30 to 300 nm on the surface of said shaped aluminum alloy material, said fine recesses having been formed by a basic reaction

as recited in amended claim 1 and similarly recited in amended claim 2. The claimed hydrazine solution reacts with an aluminum surface in a basic reaction. It is not a reduction reaction.

The Office Action acknowledged that Kallenbach does not disclose the recited dipping process. (Office Action, page 2.) The Office Action cited Akihoshi for teaching this process.

Akahoshi discloses a method of bonding copper and a resin together with consistently high bonding strength and acid resistance. Akahoshi discloses removing the oxide layer formed on the surface of copper by using a reducing agent, by a general formula: BH_3•NHRR', and including dimethylamine borane and ammonia borane. (Col. 4, lines 12-20.)

However, the reducing agent in Akahoshi does not correspond with a 3 to 10 % hydrazine (N_2H_4) monohydrate aqueous solution ($N_2H_4 \cdot H_2O$) as recited in the present claims.

Akahoshi discloses that with hydrazine, the oxide layer is hardly reduced to metallic copper, and that hydrazine did not attain metallization of the oxide layer even when the concentration, the PH value, or the treatment temperature was changed. (Col. 3, line 57 to col. 4, line 11.) Akahoshi further discloses that it is impossible to reduce the copper oxide to metallic copper with hydrazine. (Col. 5, lines 19-29.) Akahoshi solved this problem by using amine boranes as a reducing agent. (Col. 5, lines 29-34.)

Reduction of copper oxide is much easier than reduction of aluminum oxide. Although copper oxide is a representative metal which can be reduced easily, it is impossible to reduce copper oxide with hydrazine under usual conditions. Thus, one of ordinary skill in the art would recognize that aluminum oxide cannot be reduced with hydrazine under usual conditions.

The reaction caused by dipping aluminum alloy material in a 3 to 10% hydrazine monohydrate aqueous solution at 40 to 70°C is a basic reaction as recited in the claims and as shown below by the following reaction formula.

$$N_2H_4 \cdot H_2O \leftrightarrow N_2H_5^+ + OH^-$$

$$Al + OH^- + H_2O \rightarrow 3/2H^2\uparrow + AlO_2^-$$

The Office Action stated that aluminum will easily form an inherent oxide layer when exposed to air. (Office Action, page 5.) However, the inherent oxide layer of aluminum is very thin (1-3 nm thickness) and easily broken by being dipped in acid solutions or alkaline solutions. From the point of view of common general technical knowledge, one of ordinary skill in the art

would understand that the above reaction would occur immediately or after induction period by the oxide layer has been broken briefly.

B. Rejection based on Haak in view of Akihoshi

Claims 1, 2, 5, 6 and 8-13 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Haak (US 2001/0036559) in view of Akihoshi (US 4,642,161). Favorable reconsideration is requested.

Applicants respectfully submit that Haack in view of Akihoshi does not teach or suggest:

> a shaped aluminum alloy material that has been subjected to a dipping process in which it is dipped in a 3 to 10% hydrazine monohydrate aqueous solution at 40 to 70°C, said shaped aluminum alloy material having fine recesses with a diameter of 30 to 300 nm on the surface of said shaped aluminum alloy material, said fine recesses having been formed by a basic reaction

as recited in amended claim 1 and similarly recited in amended claim 2, and the similar method step as recited in amended claims 5, 6 and 14.

The Office Action acknowledged that Haak does not disclose the treatment of a shaped aluminum alloy material as recited in the claims. (Office Action, page 3.) The Office Action cited Akihoshi for teaching that the treatment would have been obvious.

For the reasons stated above, Applicants respectfully submit that Akihoshi does not teach the treatment as recited in the claims. Neither Haack nor Akihoshi discloses the treatment process and the resulting structure of the shaped aluminum alloy material as recited in the present claims, and thus, the present claims are non-obvious over Haack in view of Akihoshi.

New Claim 14

Regarding new claim 14, the prior art neither teaches nor suggests:

> dipping a shaped aluminum alloy material in a 3 to 10% hydrazine monohydrate aqueous solution at 40 to 70°C to form fine recesses having a diameter of 30 to 300nm on the surface of said shaped aluminum alloy material by a basic reaction, and to adsorb nitrogen-containing compounds attributable to hydrazine on the surface of said shaped aluminum alloy material.

According to the specification, "The purpose of this process is to finely etch the aluminum alloy surface to thereby form fine recesses and projections thereon and to adsorb such a nitrogen-containing compound on the aluminum alloy surface." (Specification, page 12, lines 14-17.) If an exothermic reaction takes place when the thermoplastic resin composition contacts the chemisorbed substances, the resin composition may enter the fine recesses on the aluminum alloy surface without rapidly cooling to become solidified. (Specification, page 3, line 27 to page 4, line 3.) Furthermore, Applicants inferred that the chlorine end reacts with amines, which are basic, under high-temperature conditions while generating heat to form salt. (Specification, page 4, lines 23-24.)

Applicants also submit that the following relations between metal and plastic would not have been obvious to one of ordinary skill in the art.

[Metal]

(1) form fine recesses having a diameter of 30 to 300nm on the surface of said shaped aluminum alloy material by a basic reaction,

(2) adsorb nitrogen-containing compounds attributable to hydrazine on the surface of said shaped aluminum alloy material;

[Plastic]

(3) integrating a thermoplastic resin composition containing polyphenylene sulfide(comprising chlorine end which reacts with amines adsorbed on the aluminum ahoy surface) to a surface of said shaped aluminum alloy material in said mold.

For at least the foregoing reasons, claims 1, 2, 5, 6 and 8-14 are patentable over the cited references. Accordingly, withdrawal of the rejections of claims 1, 2, 5, 6 and 8-13 is hereby solicited.

In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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